

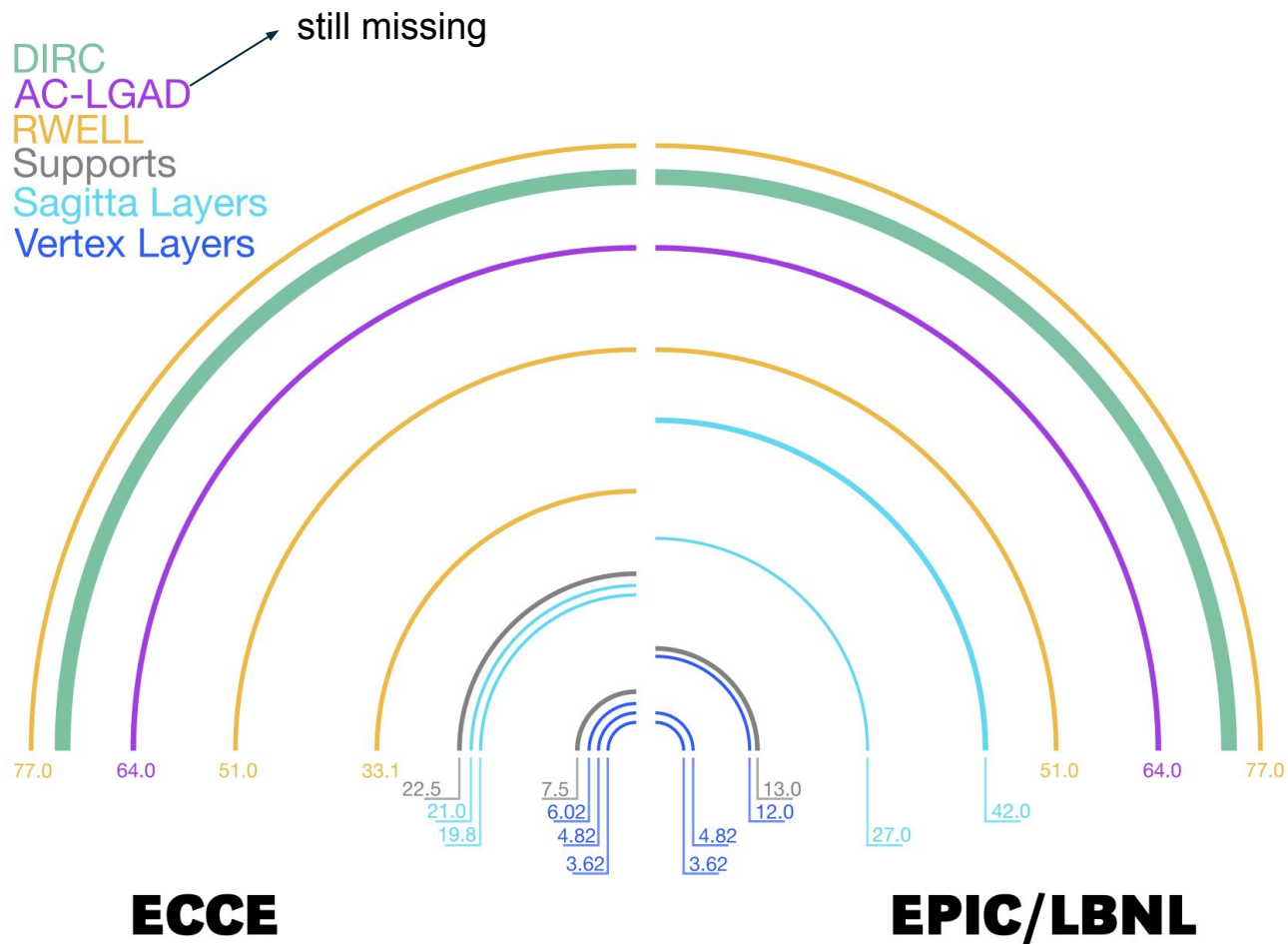
ePIC Tracker in DD4hep

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with Sylvester Joosten, Ernst Sichtermann, Reynier Cruz-Torres

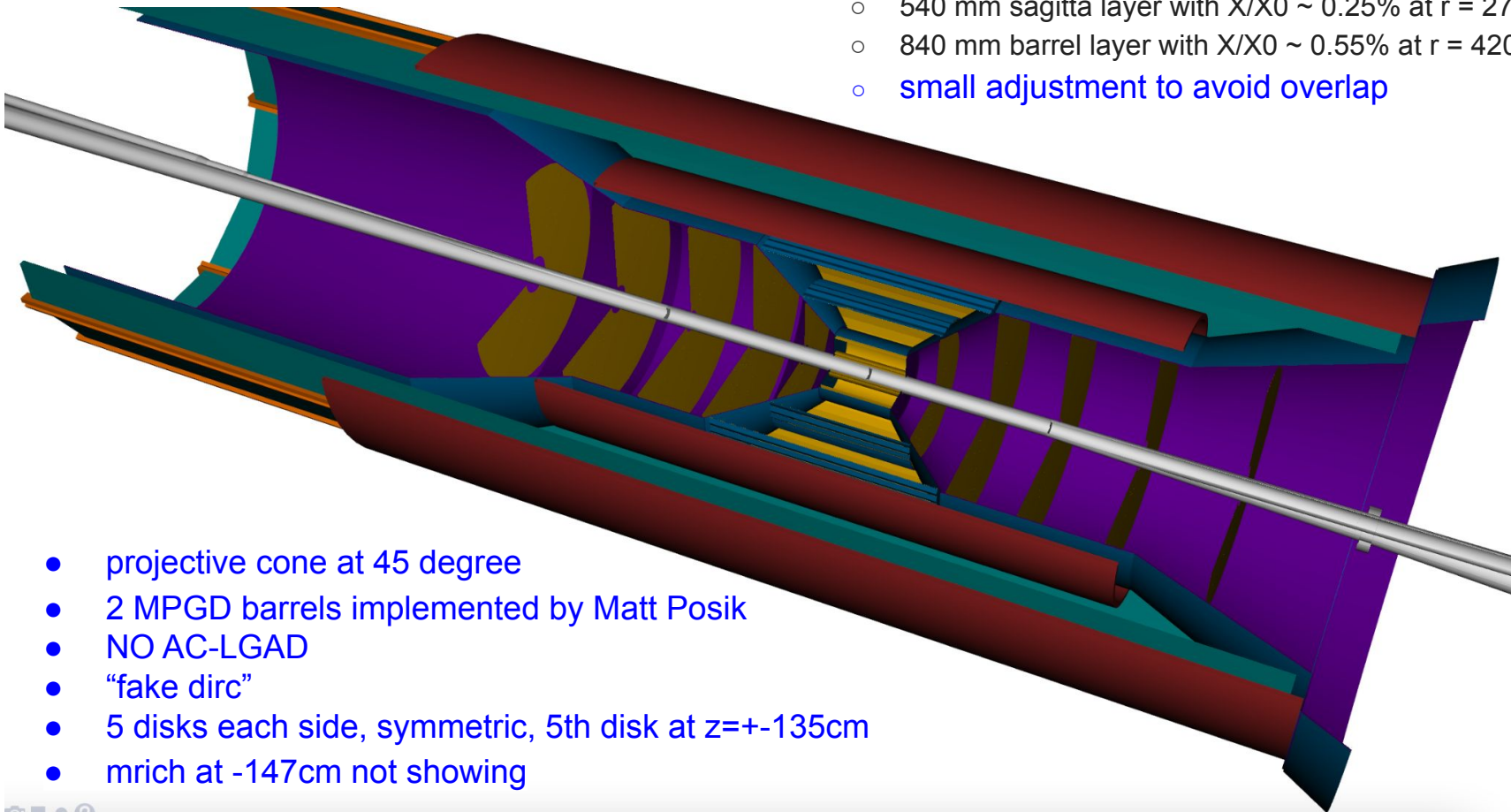
09.01.2022

LBL Proposed Barrel Geometry



Tracker volume geometry

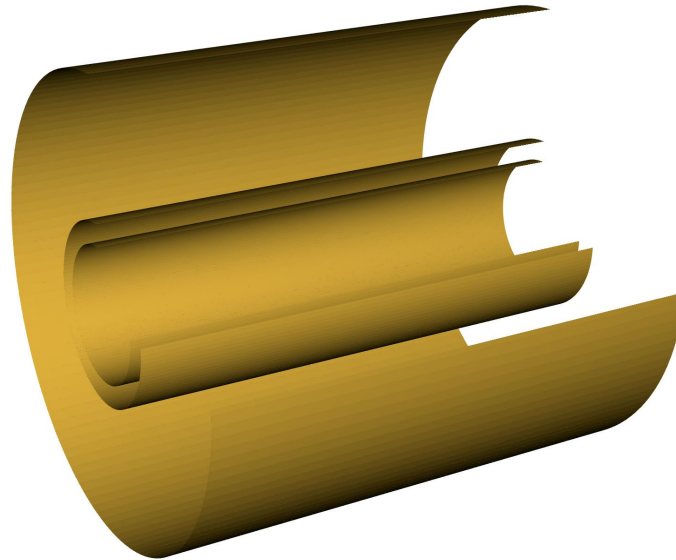
- Barrel:
 - 270 mm vertex layer with $X/X_0 \sim 0.05\%$ at $r = 36\text{mm}$
 - 270 mm vertex layer with $X/X_0 \sim 0.05\%$ at $r = 48\text{mm}$
 - 270 mm vertex layer with $X/X_0 \sim 0.05\%$ at $r = 120\text{mm}$
 - 270 mm carbon support barrel, thickness = 100 μm , $r=130\text{mm}$
 - 540 mm sagitta layer with $X/X_0 \sim 0.25\%$ at $r = 270\text{mm}$
 - 840 mm barrel layer with $X/X_0 \sim 0.55\%$ at $r = 420\text{mm}$
 - small adjustment to avoid overlap



- projective cone at 45 degree
- 2 MPGD barrels implemented by Matt Posik
- NO AC-LGAD
- “fake dirc”
- 5 disks each side, symmetric, 5th disk at $z=\pm 135\text{cm}$
- mrich at -147cm not showing

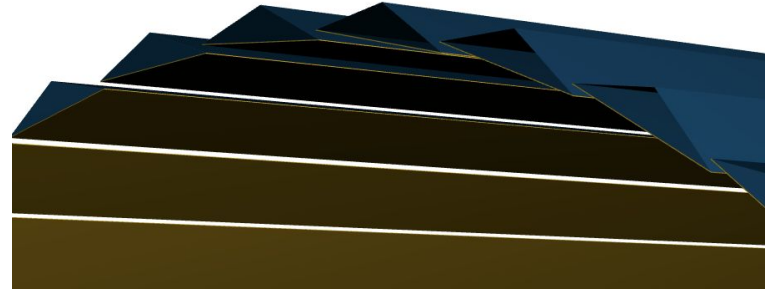
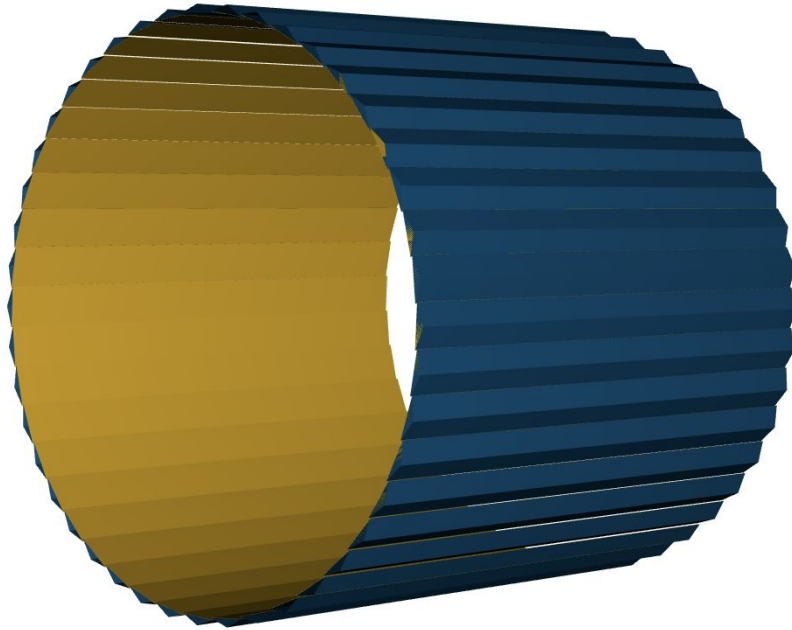
Vertex Layers

3 ITS3 silicon layers (0.04mm each) approximated with 128 staves



Sagitta Layer

44 slightly tilt triangle staves (silicon + Al + carbon fiber)

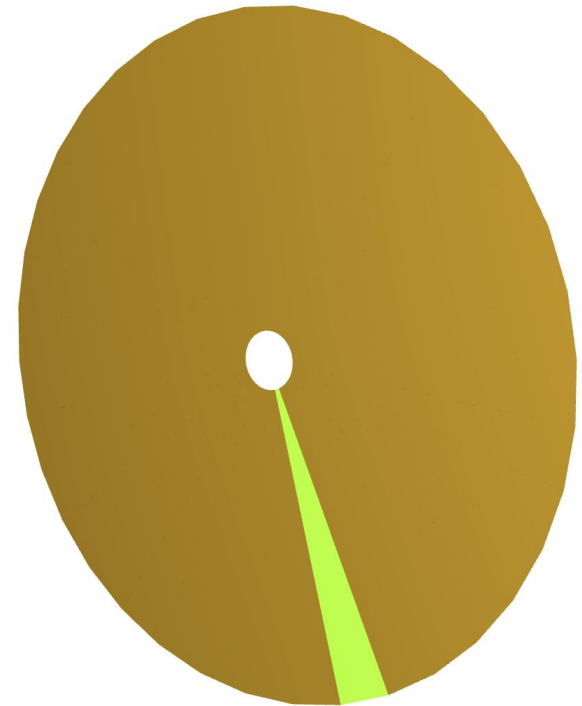


Disks

$X/X_0=0.24\%$, silicon + carbon fiber + aluminum, 36 sections

unit: cm

z	Rmin (3.18 + *)	Rmax
25	0.5	24
45	0.5	42.5
70	0.9	43.12
100	2.2	43.12
135	3.9	43.12

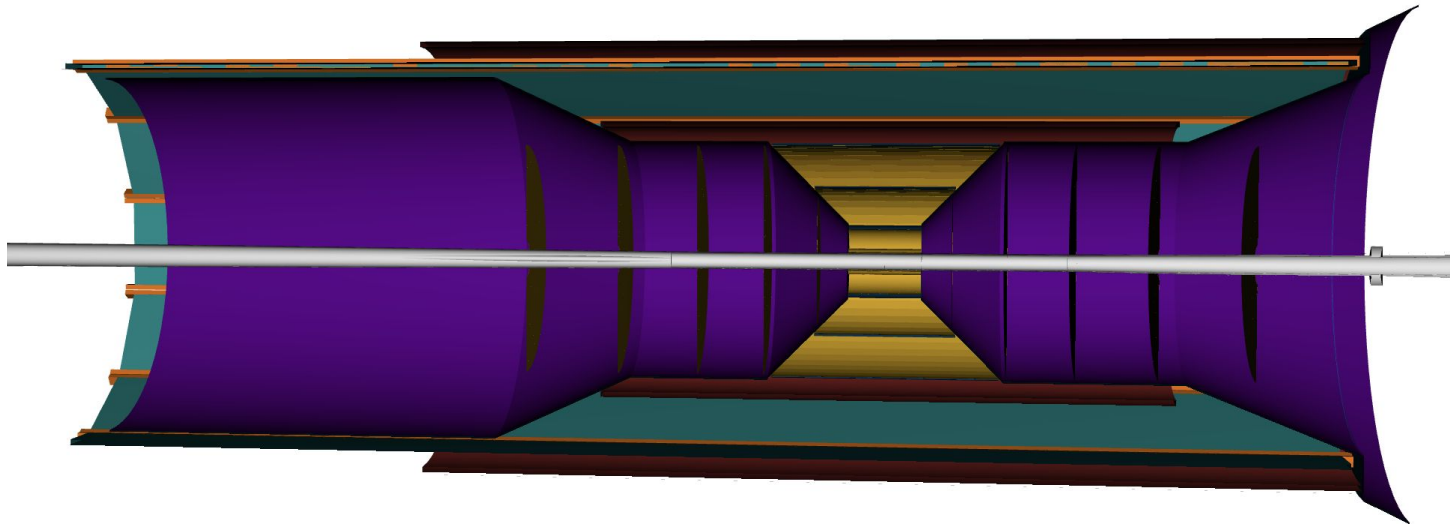


Fake DIRC??

In DD4hep description:

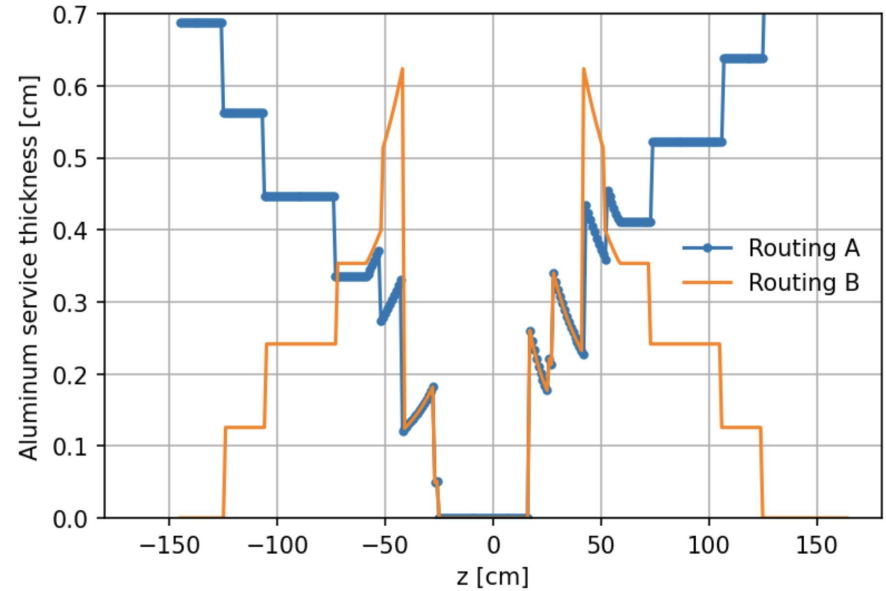
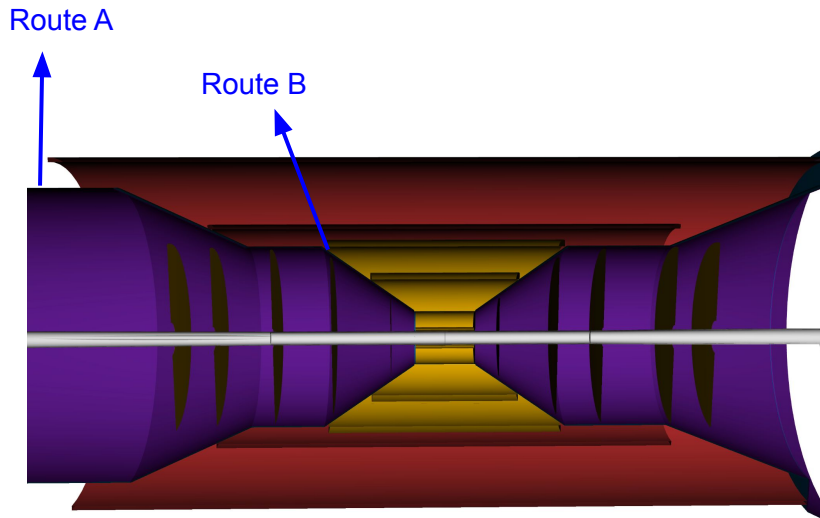
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<constant name="DIRCForward_zmax"      value="CentralTrackingRegionP_zmax"/>  
<constant name="CentralTrackingRegionP_zmax" value="1730.0*mm" />  
<constant name="DIRCBackward_zmax"     value="BackwardServiceGap_zmin"/>  
<constant name="BackwardServiceGap_zmin" value="320.0 * cm"/>
```

In DetectorParameterTable: -287cm to 168 cm

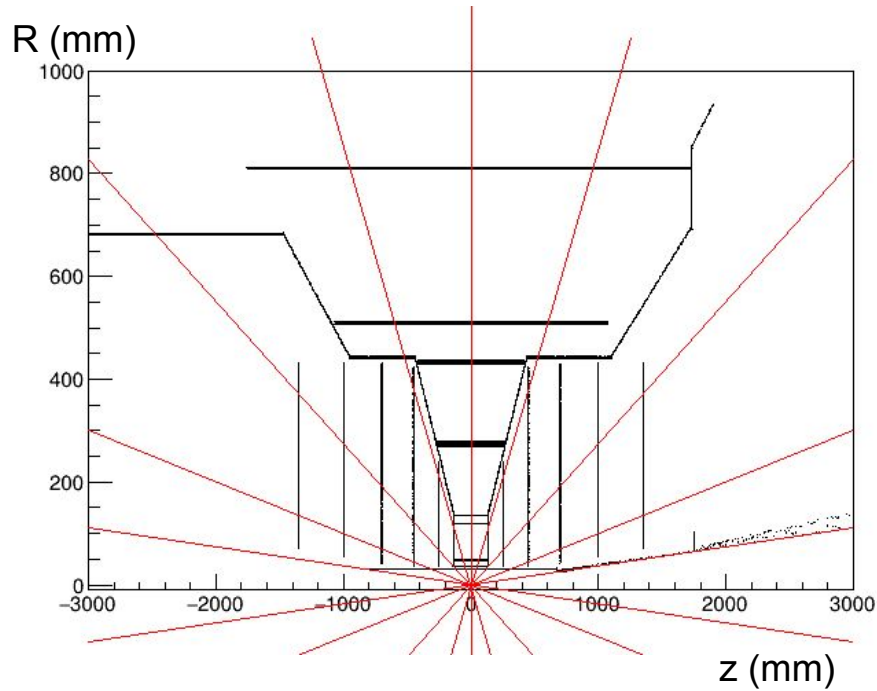


Estimation of service aluminum thickness (old version)

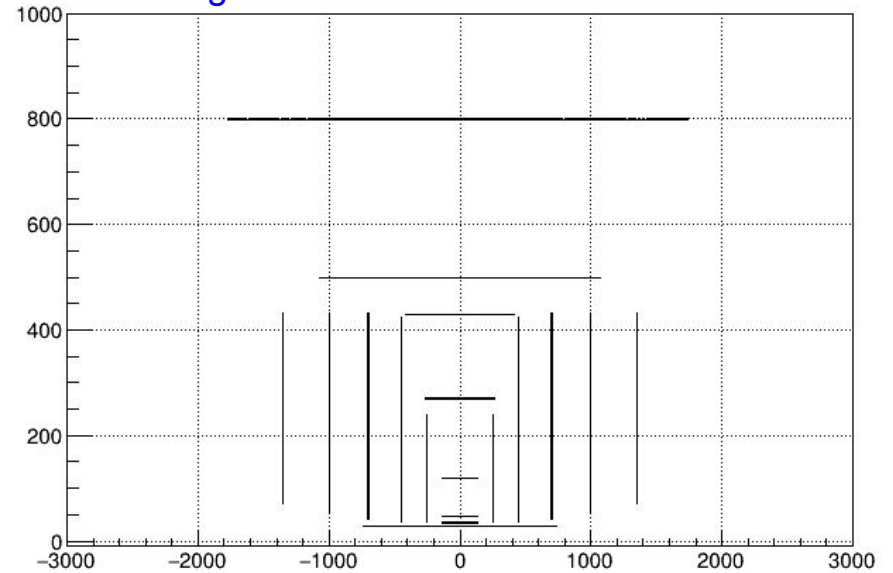
- cables from 3 vertex barrel layers go to +z side
- 2 outer barrel layers split evenly to +z
 - Route A: cables exist to end of service barrel at large $|z|$ (both sides)
 - Route B: cables exist along the cone at $\sim |z|=50\text{cm}$



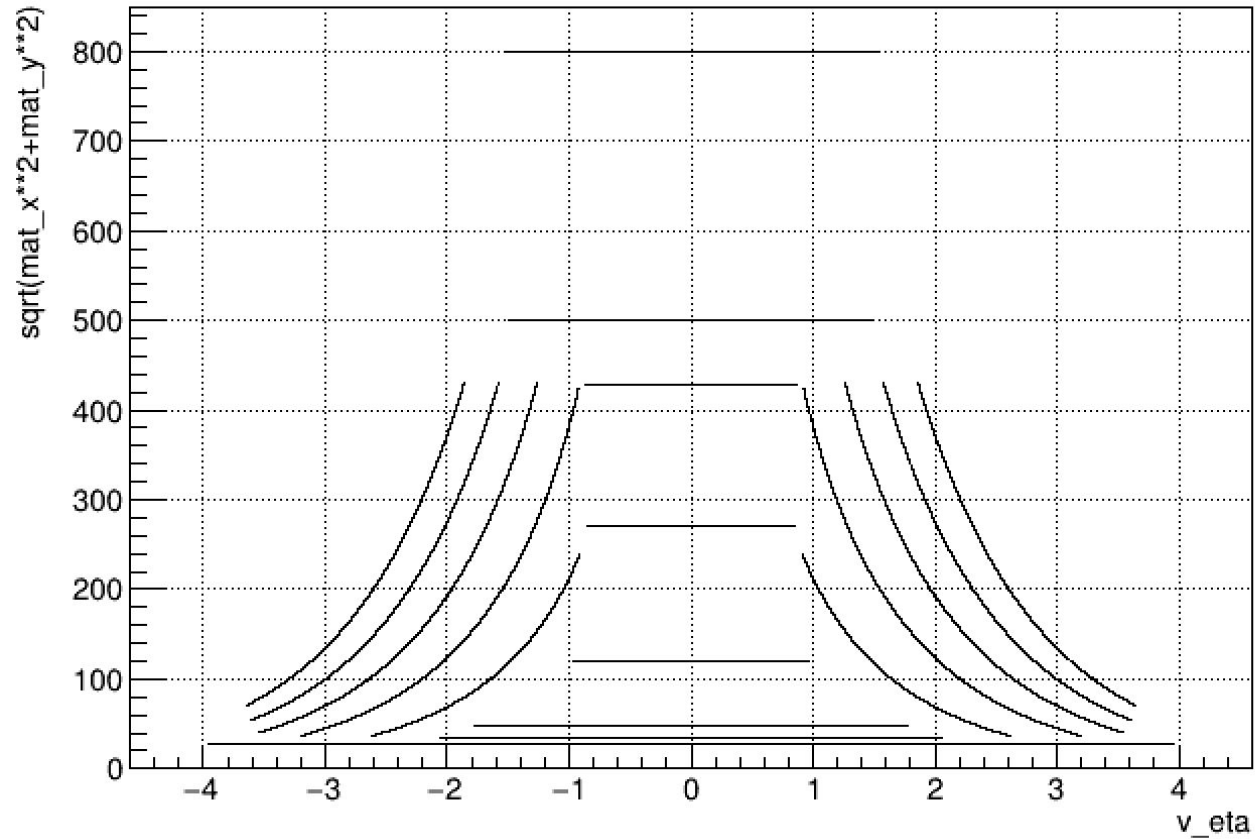
Geantino Scan vs. Material Map Validation



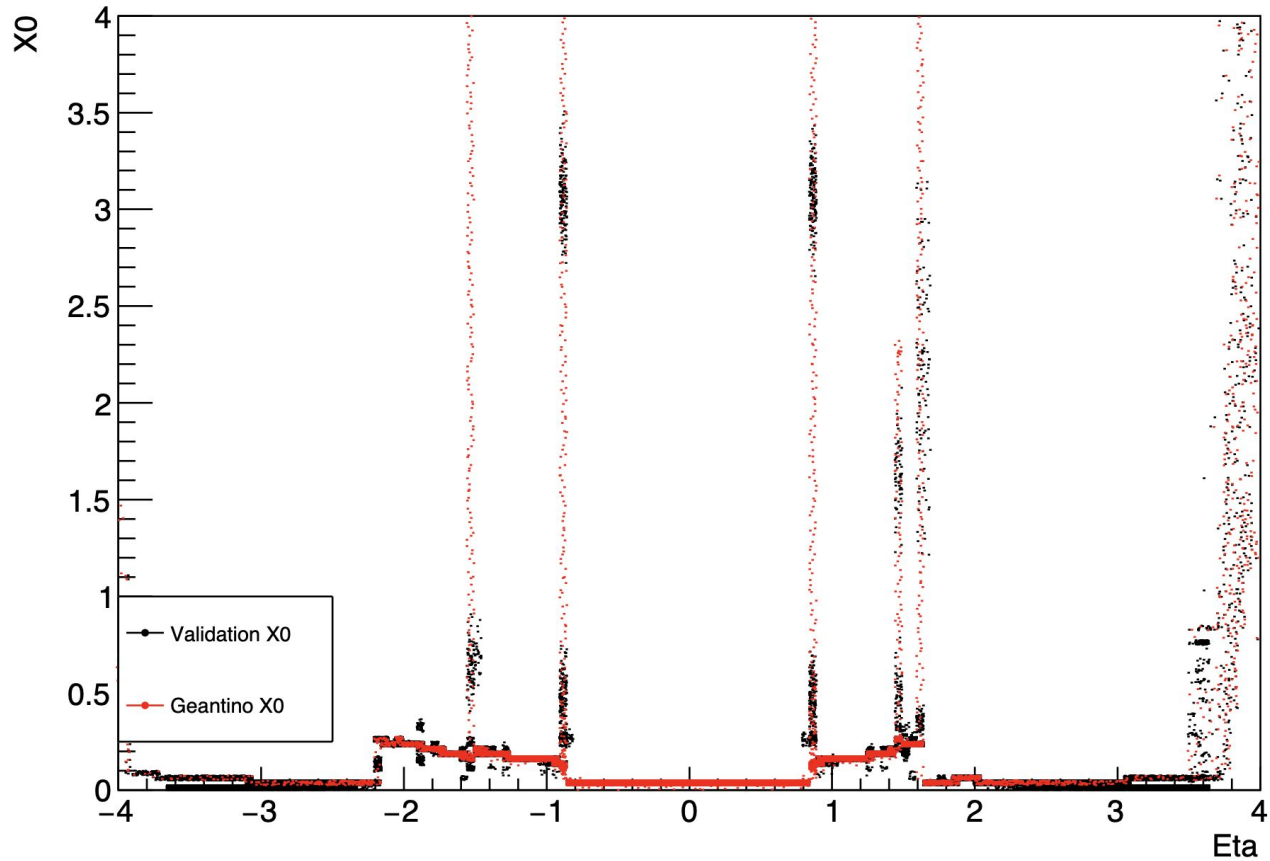
Project materials to nearest surfaces of choice with 2D binning



Surfaces for material map (R v.s. eta)



Geantino Scan vs. Material Map Validation



To do:

- confirm DIRC and AC-LGAD design
- re-run material map with fine binning
- integrate the material map production into the CI/CD pipeline